

TECHNOLOGY NEEDS/OPPORTUNITIES STATEMENT

MODELING RISK KNOWLEDGE

Identification No.: RL-SS46

Date: September 2001

Program: Environmental Restoration

OPS Office/Site: Richland Operations Office/Hanford Site

Operable Unit(s): Broad need potentially applicable to multiple operable units

PBS No.: RL-SS04 (RL-VZ01)

Waste Stream: Disposition Map Designations: ER-04 [technical risk score 3], ER-14 [technical risk score 5], ER-03 [technical risk score 3]

TSD Title: N/A

Waste Management Unit (if applicable): N/A

Facility: N/A

Priority Rating:

This entry addresses the “Accelerated Cleanup: Paths to Closure (ACPC)” priority:

- ☒ 1. Critical to the success of the ACPC
- ☐ 2. Provides substantial benefit to ACPC projects (e.g., moderate to high lifecycle cost savings or risk reduction, increased likelihood of compliance, increased assurance to avoid schedule delays)
- ☐ 3. Provides opportunities for significant, but lower cost savings or risk reduction, and may reduce uncertainty in ACPC project success.

Need Title: Modeling Risk Knowledge

Need/Opportunity Category: Technology Need.

Need Description: This need addresses specific technical gaps identified in the scope of the Groundwater/Vadose Zone Integration Project (Integration Project) at the Hanford Site and is written as an “integrated” need. The Integration Project is focused on providing the scientific and technical basis to ensure that Hanford Site decisions, including decisions related to long-term stewardship, are defensible and possess an integrated perspective for the protection of the water resources, the Columbia River, river-dependent life, and users of the Columbia River resources. As such, this “integrated” need summarizes a number of S&T components that together address a specified technical gap. Individual efforts applied to resolve the technical gaps described in this need may address all or part of the components identified for this need. Where a specific technology need can be defined separately from an “integrated” need, a specific technology need statement has been written and is included elsewhere in the Hanford Site STCG Subsurface Contamination Needs (e.g., RL-SS25: Improved, Cost-Effective Methods for Subsurface Access to Support Characterization and Remediation).

Socio-cultural risk assessment methodology is just beginning to be addressed by risk assessors, risk managers and decision-makers. The methods and approaches are poorly defined at this time. There are data gathering activities that are being defined and addressed in other endeavors within the Groundwater/Vadose Zone Integration Project to collect preliminary information on identification of affected communities, understanding the environmental values of these communities, evaluating cultural landscapes, and performing quality of life studies. The scientific need is to collect this information into a model or models that can be used to integrate all risk elements in a form that communicates effects of the Hanford Site today and into the future with the concerned communities.

This need recognizes that knowledge is socially constructed. Successor socio-cultural studies will lay the epistemological foundation for understanding how the various affected cultural communities organize knowledge relative to risk. There is a need to take those findings and produce an integrated risk perception model. The model will be essential for finding common intellectual ground, which is essential for building partnerships in dealing with Hanford Site waste. The creation of these partnerships is essential for reducing risk uncertainty and bias. These partnerships should include all culturally affected communities and decision-makers.

Addressing this need requires integrating findings from other social and cultural studies regarding the major variables and variable relationships that exist among the members of the concerned communities. The major research question to be addressed is the extent to which these variously based community variables and relationships can be simultaneously modeled or whether they are mutually irreconcilable.

To address this need, one or more integrated risk models must be developed to serve as a foundation for explaining past community behaviors with regards to risk and predicting future responses to changes in the Hanford environment.

Specifically, the need is to:

- Develop integrated risk models that will serve as a foundation for explaining past community behaviors with regards to risk and predicting future responses to changes in the environment from the waste remaining at Hanford upon site closure.
- Develop tools for communicating integrated risk to regional communities and decision-makers. These tools have to provide real-time response to the “what-if” scenarios that would be addressed in communication of risk at stakeholder/decision-maker meetings.

Schedule Requirements:

Earliest Date Required: 8/1/99

Latest Date Required: 9/30/05

The Integration Project S&T roadmap (DOE 2000) indicates that the information is required to be implemented as part of the System Assessment Capability, Revision 2. As mentioned above, there are basic data gathering activities that must be completed prior to addressing this need.

Development of the integrated risk knowledge models should begin shortly after the data gathering activities identify the affected communities.

Problem Description: This need falls under the Risk Technical Element within the S&T Endeavor. Socio-cultural risk assessment is being addressed in the Groundwater/Vadose Zone Integration Project because of a growing recognition that the conventional risk assessment paradigm does not address all of the things that are “at risk” in communities facing the prospect of contaminated waste sites or permitted chemical or radioactive releases. There is a need for developing integrated models to incorporate the information of concern to affected communities and provide tools that will be used to communicate the results of the model to them and decision-makers.

Benefit to the Project Baseline of Filling Need: Filling this need will help provide socio-cultural risk that is technically defensible. However, this need can not be addressed until other characterization activities are completed.

Functional Performance Requirements: This need addresses the integration of risks to the environment, human health, economic impacts and socio-cultural impacts. The analysis must provide information on how affected communities relate to Hanford contamination. This information will be used by decision-makers to focus remediation activities and stewardship responsibilities.

Work Breakdown

Structure (WBS) No. : 1.4.03.4.4

TIP No.:

Relevant PBS Milestone: PBS-MC-042

Justification For Need:

Technical: There is currently inadequate understanding of how cultural communities in the region will react to Hanford contamination in the future. Improved information is needed to allow decision makers to better communicate the risks that might occur in the future.

Regulatory: Information obtained by addressing this need will provide an improved technical basis for making site regulatory decisions and therefore reduce the uncertainty associated with the basis for these decisions.

Environmental Safety & Health: Safety and health are the primary concerns within modeling risk knowledge.

Potential Life-Cycle Cost Savings of Need (in \$000s) and Cost Savings Explanation:

The estimated life-cycle cost savings associated with filling this need is \$200M. This estimate is based on an assumed savings of 5% of the total Hanford remediation life-cycle cost of >\$5B. Estimated savings are due to information and data gained by filling this need that supports decisions for cost effective remediation and long-term stewardship.

Cultural/Stakeholder Concerns: The need directly relates to the cultural and stakeholder concerns of clean up at Hanford and the future of the site. The integration of their concerns within the overall risk communication process will assist in successful decision making.

Other: None.

Current Baseline Technology: N/A

End-User: Richland Environmental Restoration Project

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DOE End-User/Representative Point-of-Contact: John G. Morse, DOE-RL, (509) 376-0057

Reference:

BHI, 1999, *Groundwater/Vadose Zone Integration Project Preliminary System Assessment Capability Concepts for Architecture, Platform, and Data Management*, Letter Report, Richland, Washington.

United States Department of Energy. 2000. *Groundwater/Vadose Zone Integration Project Science and Technology Summary Description*. DOE/RL-98-48, Vol. III, Rev. 1, U.S. Department of Energy, Richland, Washington.